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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/676,197	09/28/2000	William R. Roche	2000.032200	9021

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EXAMINER
DUONG, KHANH B

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 07/31/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/676,197	Applicant(s) ROCHE ET AL.	
	Examiner Khanh Duong	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 June 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *21-31* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

This Office Action is in response to the Election filed on June 24, 2002.

Accordingly, claims 1-20 were elected with traverse and claims 21-31 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the feature "at least a portion of said layer of dopant material being ***in contact*** with said gate dielectric layer" as recited on lines 4 & 5 of Claim 9 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 7 and 16 are objected to because of the following informalities: line 5 of both claims, the phrase "layer of dielectric material" should have been --gate dielectric layer--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claims 8 and 17, lines 4 & 5, the phrase "said layer of dopant material defining a region ... between said layer of dopant material and said gate electrode" is confusing since such feature is not described in the specification. According to the specification, it appears that the "gate electrode", as underlined in the phrase above, should have been --gate dielectric layer-- (see page 9, lines 12 & 13).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8, 11-17 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Raicu (US 4,561,907).

Raicu discloses a method of forming a semiconductor device (see FIGs. 7 & 10; col. 9, line 57 to col. 10, line 3) comprising the steps of: implanting dopant atoms into a polysilicon layer 62 to define a layer 61 of dopant material in the polysilicon layer 62, the layer 61 of dopant material being completely separate from the substrate 43; and anisotropically etch the polysilicon

layers to define a polysilicon structure comprised of a plurality of sidewalls, the sidewalls having a recess formed therein.

Raicu suggests that such method should be used to form a polysilicon gate electrode 111 above a silicon dioxide gate dielectric layer (see FIG. 14; col. 10, line 63 to col. 11, line 15). Since the same method is being suggested to form the polysilicon gate electrode 111, it should be inherent that the layer of dopant material is completely separate from the layer of gate dielectric material.

Furthermore, Raicu teaches implanting phosphorous atoms into the polysilicon gate electrode layer at a concentration of $5x10^{16}$ atoms/cm^2 and an energy level of 70 keV (see col. 6, lines 18-20).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 9 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raicu (US 4,561,907) in view of Han (US 6,103,603).

Raicu fails to show at least a portion of the layer of dopant material being in contact with the gate dielectric layer.

Han teaches to implant dopant atoms into a gate electrode layer 13 to define a layer of dopant material 13a in the gate electrode layer 13, wherein at least a portion of the layer of dopant material 13a being in contact with the gate dielectric layer 12 (see FIGs. 1A & 2B; cols. 1 & 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Raicu with the teaching of Han, since Han expressly states in FIG. 2B and column 2, lines 7-12 that such modification would result with gate electrodes 23a and 23b comprising of a plurality of sidewalls having recesses that are also in contact with the gate dielectric layer 22.

Claims 10 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raicu (US 4,561,907).

Raicu fails to teach implanting dopant atoms into the polysilicon gate electrode layer at a concentration ranging from approximately $5x10^{14}$ to $5x10^{15}$ atoms/cm^2.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Raicu by selecting a specific dopant concentration for the implantation of dopant atoms into the polysilicon gate electrode layer, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or

working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wu et al. (US '975), Hsia et al. (US '391), Lee (US '246) and Nakamura et al. (US '564) disclose relevant methods relating to the instant invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (703)305-1784. The examiner can normally be reached on Monday - Friday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (703)308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

KBD
July 25, 2002

CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800